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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/772,225	02/04/2004	Shilin Chen	SC-03-02	2188

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EXAMINER	
JONES, HUGH M	

ART UNIT	PAPER NUMBER
2128	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/772,225	CHEN ET AL.	
	Examiner	Art Unit	
	Hugh Jones	2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 January 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-104* is/are pending in the application.

4a) Of the above claim(s) *29-40 and 53-104* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28 and 41-52* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 January 2009* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/6/2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-104 of U. S. Application 10/772,225, filed on 2/4/2004 are pending. Claims 1-28, 41-52 are elected; claims 29-40, 53-104 are withdrawn from consideration.

Claim Rejections - 35 USC 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claims 1-28, 41-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over [Ma et al. ("The computer simulation of the interaction between roller bit and rock" – 1995 – *of record*) or Ma ("The operational mechanics of the rock bit" – 1996 - *of record*)] in view of [Applicant's admitted prior art].

5. Ma et al. ("The computer simulation of the interaction between roller bit and rock" – 1995 – *of record*) discloses:

optimal roller bit design using computer simulation (entire paper);

operational mechanics of the roller bit geometry ("The model of bit and bottom"; "roller bit"; "bottom hole");

kinematics of the bit ("The model of bit and bottom"; rotation angle of cone"; "The simulation of interaction");

rock-bit interaction and crater analysis ("crater model"; "Interaction between bit and rock");

bit design including force analysis ("The simulation of Interaction").

6. Ma ("The operational mechanics of the rock bit" – 1996 - *of record*) discloses:

optimal roller bit design using computer simulation (chapter 6) based on the entire teachings in the book, including

operational mechanics of the roller bit geometry (details in chapter 2);

kinematics of the bit (details in chapter 3);

rock-bit interaction (details in chapter 5); and

bit design including force analysis (see page 232: "evaluate the size, load, motion, stress, and strain of each part…").

7. Ma et al. (1995) or Ma et al. (1996) do teach optimal design but do not <u>*expressly*</u> teach that the optimal design consists of varying the specific types of teeth and their specific various locations and orientations as recited in the claims.

8. The specification teaches that the types of teeth and the variations of their possible locations and orientations were known (pp. 4-5: Background: roller cone bit design; pp. 5-6: Background: tooth design; pp. 6-7: types of bits corresponding to types of formations; pp. 7-8: interaction of bit and formation; pp. 8-9: bit design background; pg. 9:known needs for improvement).

9. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the teachings of Ma et al. to consider as optimal design such a design wherein the production is maximized. It was well known in the art at the time of the invention to those of ordinary skill in the art that a pervasive problem in the industry was that of finding optimal bit design. Thus, It would have been obvious to one of ordinary skill in the art at the time of the invention was to modify the teachings of Ma et al. to consider variations of known parameters in order to optimize drilling production.

10. Nothing inventive has been produced by varying the types of teeth and their various locations and orientations via *routine testing* (optimization) of a design.

11. The court (*Pfizer v. Apotex F.3d (Fed. Cir. 2007)),* referring to *Dystar*, distinguished 'routine testing' from *the work of an inventor*:

> *"The experimentation needed, then, to arrive at the subject matter claimed in the...patent was nothing more than routine application of a well-known problem solving strategy and, we conclude, the work of a skilled artisan, not of an inventor." (internal citation and quotations omitted) (citing Dystar).*

12. The court characterized *the phamacopoeia- and compendium- guided work of the Plaintiff-Appellee as 'routine testing' conducted to merely verify an expectation of success in contrast to 'trial and error procedures' that support true discovery.*

13. The *act of designing* a bit indicates an *expectation of a successful design*.

14. The court further characterized Pfizer's 'routine testing' efforts as merely "verification testing...to ease its commercial manufacturing and marketing of the tablet form of the therapeutic [composition]," the Court quoted the language from *Dystar* that refers to the existence of an *implicit motivation to combine* when the efforts are aimed at creating a product that is more desirable because it is "stronger, cheaper, cleaner, etc." (emphasis added):

> *"At most, then, Pfizer engaged in routine, verification testing to optimize selection of one of several known and clearly suggested pharmaceutically-acceptable salts to ease its commercial manufacturing and marketing of the tablet form of the therapeutic amlodipine. Creating a "product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more **durable**, or more **efficient** . . . to enhance commercial opportunities . . . is universal—and even common-sensical." (emphasis added) (citing Dystar).*

15. It would have also been obvious to a person of ordinary skill in the art at the time of the invention to simulate the interaction of a bit with the earth because it is recognized that use of a known technique (namely simulating the interaction of a bit with earth) to improve a similar apparatus *(drill bit)* in the same way is not sufficient to distinguish over the prior art.

16. One of ordinary skill in the art could have applied the known "improvement" technique in the same way to the "base" device and the results would have been predictable to one of ordinary skill in the art.

17. Applicants have not invented the simulation of bits, and have merely applied a known technique to improve a bit in the same way. The improvement is nothing more than the predictable use of known techniques to the prior art elements.

18. It would have been obvious to one of ordinary skill in the art at the time of the invention that a method of enhancing a particular class of apparatus was made part of the ordinary capabilities of one skilled in the art based upon the teaching of such improvement in other situations. One attempting to design an optimal bit would naturally simulate the interaction between the bit and earth to see which parameters lead to the optimal solution.

19. One of ordinary skill in the art would have been capable of applying known methods of simulating the interaction of roller cone bits with earth (Ma et al., for example) to the design of the bits and the results would have been predictable to one of ordinary skill in the art. The Supreme Court in KSR noted that “if the actual application of the technique would have been beyond the skill of one of ordinary skill in the art, then using the technique would not have been obvious."

20. *KSR* said that "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. ... In that instance the fact that a combination was obvious to try might show that it was obvious...." The fact that applicants as well as others including Ma et al. are using the same techniques (designing bits using simulations of the bits with earth) to solve the same problem (maximizing drilling production), demonstrates that there are a finite number of predictable solutions (bit designs). Furthermore, there are only a finite number of drill bit parameters – thus there are a finite number of predictable solutions.

Response to Arguments (1/6/2009)

21. Applicant's arguments regarding the art rejections are not persuasive.

22. Applicants argue (15):

> "varying the specific types of teeth and their specific various locations and orientations as recited in the claims." *Office Action*, pg. 4. In fact, *Ma '96* does make reference teeth spacing and crest orientation. *Ma '96*, pg. 231. However, *Ma '96* makes no mention whatsoever of adjusting an axis of a tooth. *Ma '95* similarly fails to teach, disclose, or even suggest adjusting an axis of a tooth. However, the Examiner goes on to state that the Background section of Applicant's own Specification teaches "the variations of [the teeth's] possible locations and orientations." *Office Action*, pg. 4. Applicants respectfully disagree. While Applicant's Background does discuss roller cone bit design and tooth design in general, there is no mention whatsoever of adjusting an axis of a tooth. To this end, Applicant respectfully contends that, while the references disclose various aspects of bit design, there is no teaching, disclosure, or suggestion of adjusting an axis of a tooth in accordance with the angle at which said tooth indents rock at the start of a trajectory of the tooth.

The specification teaches that the types of teeth and the possible variations of their locations and orientations were known (pp. 4-5: Background: roller cone bit design; pp. 5-6: Background: tooth design; pp. 6-7: types of bits corresponding to types of formations; pp. 7-8: interaction of bit and formation; pp. 8-9: bit design background; pg. 9:known needs for improvement). Page 10 also provides other examples of prior art teachings of axis orientations (such as US 5197555).

23. Applicants further argue (pp. 15-16):

> In contrast, the particularized facts surrounding the present Application fail to show that the elements of Claim 1 are obvious or that a method for designing a bit using simulation is mere routine testing. To begin with, *Ma '96* repeatedly discusses the great complexity of drill bit design, taking into a myriad of factors including applied force, stress, strain, wear, speed, and material of multiple components, including the various drill cones and their respective teeth, not to mention the makeup of the rock being drilled. *See Ma '96*, pg. 12. Thus, computer simulation is far from the "routine testing" of one single variable parameter. Additionally, *Ma '96* also discloses that, even with advances in bit simulation, parts of the drilling process remains "highly stochastic" and unpredictable. *See Ma '96*, pg. 233. Finally, as discussed above, none of the cited references teach, disclose, or suggest adjusting an axis of a tooth. As such, one of ordinary skill in the art would not have a "finite number of identified, predictable solutions," as the Office Action contends. *Office Action*, pg. 6. For at least these reasons, Applicant respectfully requests reconsideration and allowance of Claim 1.

24. Nothing inventive has been produced by varying the types of teeth and their various locations and orientations via *routine testing* (optimization) of a design. There are only a few degrees of freedom for bit design as it relates to tooth orientation. The argument that the design is complex is not persuasive. The computer simulation merely carries out brute force iteration through the known prior art variables. A review of the specification suggests nothing to the contrary. Thus, there is no real issue of complexity with respect to obtaining optimized solutions.

25. The court (*Pfizer v. Apotex F.3d (Fed. Cir. 2007)),* referring to *Dystar*, distinguished 'routine testing' from *the work of an inventor*:

> *"The experimentation needed, then, to arrive at the subject matter claimed in the...patent was nothing more than routine application of a well-known problem solving strategy and, we conclude, the work of a skilled artisan, not of an inventor." (internal citation and quotations omitted) (citing Dystar).*

26. Applicants have not invented the simulation of bits, and have merely applied a known technique to improve a bit in the same way. The improvement is nothing more than the predictable use of known techniques to the prior art elements.

27. It would have been obvious to one of ordinary skill in the art at the time of the invention that a method of enhancing a particular class of apparatus was made part of the ordinary capabilities of one skilled in the art based upon the teaching of such improvement in other situations. One attempting to design an optimal bit would naturally simulate the interaction between the bit and earth to see which parameters lead to the optimal solution.

28. One of ordinary skill in the art would have been capable of applying known methods of simulating the interaction of roller cone bits with earth (Ma et al., for example) to the design of the bits and the results would have been predictable to one of ordinary skill in the art. The Supreme Court in KSR noted that “if the actual application of the technique would have been beyond the skill of one of ordinary skill in the art, then using the technique would not have been obvious."

29. *KSR* said that "[w]hen there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. ... In that instance the fact that a combination was obvious to try might show that it was obvious...." The fact that applicants as well as others including Ma et al. are using the same techniques (designing bits using simulations of the bits with earth) to solve the same problem (maximizing drilling production), demonstrates that there are a finite

number of predictable solutions (bit designs). Furthermore, there are only a finite number of drill bit parameters – thus there are a finite number of predictable solutions.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hugh Jones whose telephone number is (571) 272-3781. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hugh Jones/
Primary Examiner, Art Unit 2128